

**PATENT APPLICATION**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of

Kenji UEDA, et al.

Continuation of  
Appln. No.: 09/482,615

Group Art Unit: Not Assigned

Confirmation No.: Not Assigned

Examiner: Not Assigned

Filed: November 15, 2001

For: LIQUID CRYSTAL DISPLAY DEVICE USING A HOLOGRAM, HOLOGRAM  
SCATTER PLATE, AND PROCESS OF REPLICATING A DIFFUSE REFLECTION  
TYPE HOLOGRAM

**PRELIMINARY AMENDMENT**

Commissioner for Patents  
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

**IN THE CLAIMS:**

**Claims 1-4, 7, 8, and 12-17 are canceled without prejudice or disclaimer.**

**Please enter the following amended claims:**

5. (Amended) A liquid crystal display device using a hologram, characterized in that a liquid crystal display element is provided on a back surface side thereof opposite to a display surface side thereof with a diffuse reflection type hologram itself capable of diffusing and reflecting light of selected wavelengths incident from a specific direction only in a direction

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defined as a viewing region, wherein said hologram has a different optical function with respect to different respective wavelengths.

9 (Amended). The liquid crystal display device using a hologram according to Claim 5, characterized in that when a TN liquid crystal cell is used as the liquid crystal display element, the diffuse reflection type hologram enables light incident thereon from above and at an angle of about  $20^{\circ}$  with respect to a normal line thereof to be diffused and reflected within a range defined by an upward angle about  $10^{\circ}$ , a downward angle of about  $40^{\circ}$ , and breadth-wise angles of about  $60^{\circ}$ .

10 (Amended). The liquid crystal display device using a hologram according to Claim 5, characterized in that when an STN liquid crystal cell is used as the liquid crystal display element, the diffuse reflection type hologram enables light incident thereon from above and at an angle of about  $20^{\circ}$  with respect to a normal line thereof to be diffused and reflected within a range defined by an upward angle about  $20^{\circ}$ , a downward angle of about  $30^{\circ}$ , and breadth-wise angles of about  $30^{\circ}$ .

11 (Amended). The liquid crystal display device using a hologram according to Claim 10, characterized in that a self-luminous type backlight unit is located on the back surface side of the diffuse reflection type hologram.

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21. The diffuse reflection type hologram replication process according to Claim 18, characterized in that a combined index matching and lubricating liquid is contained between the diffuse reflection type hologram plate and the photosensitive material film.

22. The diffuse reflection type hologram replication process according to Claim 18, characterized in that the light beam of linear shape in section is a light beam that diverges in a linear direction thereof alone.

**Please add the following new 23-34 claims:**

Claim 23. The liquid crystal display device using a hologram according to claim 6, characterized in that when a TN liquid crystal cell is used as the liquid crystal display element, the diffuse reflection type hologram enables light incident thereon from above and at an angle of about  $20^\circ$  with respect to a normal line thereof to be diffused and reflected within a range defined by an upward angle of about  $10^\circ$ , a downward angle of about  $40^\circ$ , and breadth-wise angles of about  $60^\circ$ .

Claim 24. The liquid crystal display device using a hologram according to claim 6, characterized in that when an STN liquid crystal cell is used as the liquid crystal display element, the diffuse reflection type hologram enables light incident thereon from above and at an angle of about  $20^\circ$  with respect to a normal line thereof to be diffused and reflected within a range defined

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by an upward angle of about  $20^\circ$ , a downward angle of about  $30^\circ$ , and breadth-wise angles of about  $30^\circ$ .

Claim 25. The liquid crystal display device using a hologram according to claim 24, characterized in that a self-luminous type backlight unit is located on the back surface side of the diffuse reflection type hologram.

Claim 26. The diffuse reflection type hologram replication process according to claim 19, characterized in that a combined index matching and lubricating liquid is contained between the diffuse reflection type hologram plate and the photosensitive material film.

Claim 27. The diffuse reflection type hologram replication process according to claim 20, characterized in that a combined index matching and lubricating liquid is contained between the diffuse reflection type hologram plate and the photosensitive material film.

Claim 28. The diffuse reflection type hologram replication process according to claim 19, characterized in that the light beam of linear shape in section is a light beam that diverges in a linear direction thereof alone.

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Claim 29. The diffuse reflection type hologram replication process according to claim 20, characterized in that the light beam of linear shape in section is a light beam that diverges in a linear direction thereof alone.

Claim 30. The diffuse reflection type hologram replication process according to claim 21, characterized in that the light beam of linear shape in section is a light beam that diverges in a linear direction thereof alone.

31 The liquid crystal display device of claim 5, characterized in that said diffuse reflection type hologram is a hologram obtained by

fabricating one transmission type hologram for each wavelength,

fabricating from the transmission type hologram fabricated for each wavelength one reflection type hologram for each wavelength, and

making a replica of said reflection type hologram by interference of diffracted light and incident light in a photosensitive film.

32. A liquid crystal display device of claim 6, characterized in that a polarizing plate, a hologram, a color tuning film and a reflecting layer are laminated together in order from a liquid crystal side.

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33. A liquid crystal display device of claim 32, characterized in that said hologram is a color hologram with interference fringes recorded thereon in such a way as to diffract a plurality of wavelengths including red, green and blue wavelengths.

34. A liquid crystal display device of claim 5, wherein said hologram has high wavelength selectivity.

U.S. Pat. No. 7,333,333

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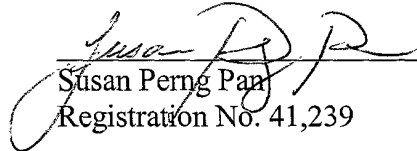
**REMARKS**

Entry and consideration of this Amendment which adds claims 23-34 is respectfully requested. A Supplemental Preliminary Amendment will also be filed to provide any necessary changes to the specification.

Respectfully submitted,

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**APPENDIX**

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE CLAIMS:**

**The claims are amended as follows:**

5. (Amended) A liquid crystal display device using a hologram, characterized in that a liquid crystal display element is provided on a back surface side thereof opposite to a display surface side thereof with a diffuse reflection type hologram itself capable of diffusing and reflecting light of selected wavelengths incident from a specific direction only in a direction defined as a viewing region, wherein said hologram has a different optical function with respect to different respective wavelengths.

9 (Amended). The liquid crystal display device using a hologram according to Claim 5 [or 6], characterized in that when a TN liquid crystal cell is used as the liquid crystal display element, the diffuse reflection type hologram enables light incident thereon from above and at an angle of about 20° with respect to a normal line thereof to be diffused and reflected within a range defined by an upward angle about 10°, a downward angle of about 40°, and breadth-wise angles of about 60°.

10 (Amended). The liquid crystal display device using a hologram according to Claim 5 [or 6], characterized in that when an STN liquid crystal cell is used as the liquid crystal display element, the diffuse reflection type hologram enables light incident thereon from above and at an



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angle of about 20° with respect to a normal line thereof to be diffused and reflected within a range defined by an upward angle about 20°, a downward angle of about 30°, and breadth-wise angles of about 30°.

11 (Amended). The liquid crystal display device using a hologram according to Claim [1] 10, characterized in that a self-luminous type backlight unit is located on the back surface side of the diffuse reflection type hologram.

21 (Amended). The diffuse reflection type hologram replication process according to [any one of Claims] Claim 18 [to 20], characterized in that a combined index matching and lubricating liquid is contained between the diffuse reflection type hologram plate and the photosensitive material film.

22 (Amended). The diffuse reflection type hologram replication process according to [any one of Claims] Claim 18 [to 21], characterized in that the light beam of linear shape in section is a light beam that diverges in a linear direction thereof alone.

**Claims 23-34 are added as new claims.**